POLICY RESEARCH WORKING PAPER 2170

The Distributional Consequences of Monetary Policy

Evidence from Malaysia

Ilker Domaç

Policymakers in Malaysia should weigh the distributional consequences of policy actions. They should also consider measures to alleviate the disproportionate impact that market imperfections have on small and medium-size industries

The World Bank
East Asia and Pacific Region
Poverty Reduction and Economic Management Unit
August 1999

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Summary findings

Domaç provides a descriptive analysis of credit and monetary policies in Malaysia and investigates the distributional consequences of monetary policy there by focusing on small and medium-size industries and large manufacturing firms.

Domaç suggests that "payoff" or "default" risk — as captured by the spread between safe and risky debt — is still well above its pre-crisis level, underscoring the increased agency costs of external finance. The decline in lending activity in the first half of 1998 can be attributed to the reduced supply of bank credit relative to demand.

Empirical results from vector autoregression analysis demonstrate that monetary tightening disproportionately affects small and medium-size enterprises.

Moreover, monetary shocks contribute substantially more to small and medium-size firms' variance of production (71 percent) than to that of large manufacturing firms (30 percent).

These findings corroborate the notion that small and medium-size industries face greater market imperfections, which in turn magnify the effects of a given policy shift.

Policymakers should weigh the distributional consequences of policy actions and should consider measures to alleviate the disproportionate impact that market imperfections have on small and medium-size industries.

Measures to alleviate information asymmetry in credit markets — including the promotion of cooperative or mutual guarantee schemes for small and medium-size enterprises — are one useful option. Groups of firms in Southern Europe have made wide use of mutual guarantee schemes — usually within a specific industry — to provide a privately organized "insurance system" for lending banks that allows the banks to rely less on the assets of individual companies within the group in making loan decisions. The pooling effects of such a system would reduce the risk to the bank of default and would give members of the society an incentive to reveal information to the society that they might hesitate to give to the bank.

This paper — a product of the Poverty Reduction and Economic Management Unit, East Asia and Pacific Region — is part of a larger effort in the region to analyze the patterns and consequences of the East Asian crisis, with particular reference to the links between the real and financial sectors. Copies of the paper are available free from the World Bank, 1818 H Street NW, Washington, DC 20433. Please contact Armanda Carcani, room O4-015, telephone 202-473-0241, fax 202-522-2751, Internet address acarcani@worldbank.org. Policy Research Working Papers are also posted on the Web at http://www.worldbank.org/html/dec/Publications/Workpapers/home.html. The author may be contacted at idomac@worldbank.org. August 1999. (36 pages)

The Distributional Consequences of Monetary Policy: Evidence from Malaysia

by

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JEL Classification Numbers: E44, E51, E52

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* Ilker Domaç is an economist in the Europe and Central Asia Region. I would like to thank Cevdet Denizer, Giovanni Ferri, Ejaz Ghani, Arvind Gupta, Kim Leng, Maria Soledad Martinez Peria, Saha Meyanathan, Ngozi Okonjo-Iweala, Vivek Suri, and Michael Yap for their helpful comments and contributions.

1. Introduction

The initial policy response to the Asian crisis which, *inter alia*, included tight monetary and fiscal policy along with structural measures, has attracted as much attention as the crisis itself. In particular, many experts questioned the effectiveness of the use of high interest rates to defend the currency, to restore confidence, and to attract capital inflows. It has been argued that high interest rates not only undermined the recovery prospects of the economies in the region, but also that they increased the fragility of the banking sector.[1] There are, however, studies which dispute this argument and contend that the monetary tightening was neither excessive nor a major factor contributing to the sharp decline in output.[2]

The different conclusions reached by different studies appears to stem from the fact that those who argue that monetary policy tightening was not extreme and that it was unlikely to have been a major factor behind the output decline focus largely on *aggregate consequences of policy actions*. By contrast, those who claim that monetary policy was excessively tight and that it contributed to increased bankruptcies, thus undermining prospects for economic recovery, recognize the importance of *distributional consequences of policy actions*.

More specifically, the first view -- often characterized as *the money view* -- argues that higher default-risk-free interest rates following a monetary contraction decreases desired

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1 Feldstein (1998) contends that an increase in interest rates will lead to widespread bankruptcies when: (i)inflation is low; (ii) the roll over of bank loans and the demand for the domestic currency hinges more on confidence than on interest rates; and (iii) the failures will reduce the prospect of loan repayment. Although it is true that the depreciation would increase the risk of bankruptcies among companies with large foreign debt, the overall damage would be less extensive than the bankruptcies caused by a very high domestic interest rate that would hurt every company. Furthermore, as Drazen and Masson (1994) have demonstrated, if the costs of implementing tight policies are too high, the temporary policy would actually reduce credibility because investors know that the policy could not be sustained. Similarly, to the extent that investors believe that high interest rates are not sustainable in the presence of a fragile banking sector and to the extent they anticipate a government bailout of the financial sector, they would expect that tight monetary policy will eventually be abandoned. As a result, higher interest rates will not be an effective tool to defend the domestic currency. See also Stiglitz (1998), Ding, Domaç, and Ferri (1998), and Domaç and Ferri (1998) for more on the potential adverse consequences of high interest rates.

2 See, for instance, Lane, Ghosh, Hamann, Phillips, Schulze-Ghattas and Tsikate (1998) as well as Goldfajn and Baig (1998).

investment by firms and households.[3] While desired investment declines, the reduction in business and household capital affects the least productive projects. Since the most profitable projects continue to be funded, there are no direct efficiency losses associated with the distributional aspects of the policy-induced interest rate increase.

On the other hand, the second view -- often referred to as *the credit view* -- analyzes the ways in which monetary policy can influence the interaction between borrowers and lenders in financial markets and the resulting consequences for economic activity.[4] By emphasizing a combination of capital market imperfections and portfolio balance effects based on imperfect asset substitutability, the credit view suggests the possibility that the policy's incidence may differ substantially across agents in the economy. Moreover, the impact of policy shifts has to do with the characteristics of the individuals that are not linked to the inherent creditworthiness of the investment projects. An entrepreneur may be turned down by the lender simply because of a currently low net worth, in spite of the social return to the project. It is, therefore, important to understand whether the decline in investment caused by monetary policy shifts has these consequences.

The paper has two main goals. First, it attempts to provide a brief descriptive analysis of the credit and monetary conditions in the aftermath of the crisis in Malaysia, with a specific reference to the credit channel literature. Second, it aims to empirically investigate the distributional consequences of policy actions by focusing on the response of small and medium size industries and large manufacturing firms to monetary policy shifts in Malaysia. Since the

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3 The money view relies on four important assumptions: (i) the central bank must control the supply of outside money for which there are imperfect substitutes; (ii) the central bank can influence real and nominal short-term interest rates -- prices do not adjust instantaneously; (iii) policy induced changes in real interest rates have an impact on longer-term interest rates affecting household and business spending decisions; and (iv) changes in interest sensitive spending in response to a monetary policy innovation correspond reasonably well with observed output responses to such innovations.

4 As Bernanke and Gertler (1995) point out, the credit view should not be considered as a distinct, free-standing alternative to the money view, but rather as a set of factors that amplify and propagate conventional interest rate effects. As they

existing literature on this topic has largely concentrated on industrialized countries, this paper will contribute to the literature by considering a developing nation -- Malaysia.

The results from the descriptive analysis suggest that "payoff" or "default" risk, *as captured by the spread between risky and safe debt*, is still well above its pre-crisis level, thus highlighting the increased agency costs of external finance. The empirical results from the vector autoregression analysis demonstrate that monetary tightening has a larger impact on small medium size industries (SMIs) than it does on large manufacturing firms (LMFs). The findings also underscore that the effect of monetary shocks on the production of SMIs is more persistent than that of LMFs, and monetary shocks contribute substantially more to the variance of the production of SMIs than that of LMFs. Therefore, the findings of this paper lend support to the notion that SMIs face greater market imperfections -- imperfections which in turn magnify the effects of a given policy shift.

The remainder of the paper is organized as follows. Section 2 describes the analytical framework for evaluating disruptions to the credit market. Section 3, drawing on the framework, provides a descriptive analysis of the credit and monetary conditions. Section 4 presents the empirical framework and results. Finally, Section 5 concludes the paper.

2. Identifying Credit Market Disruptions : A General Framework

According to the money view, reductions in the quantity of outside money increase real rates of return, which in turn leads to a decline in investment. Since this theory is based on the notion that there are no externalities or market imperfections, only the least socially productive projects drop out. Although following a monetary contraction, capital stock is marginally lower, the allocation of the decline across sectors is nonetheless socially efficient.

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suggest, the term "credit view" or "credit channel" is something of a misnomer; the credit channel is an enhancement

The credit view, on the other hand, argues that the direct effects of monetary policy on interest rates are augmented by endogenous changes in external finance premium -- the difference in cost between funds raised externally (by issuing equity or debt) and funds generated internally (by retaining earnings). The magnitude of the external finance premium reflects imperfections in the credit market -- imperfections that create a wedge between the expected return received by the lenders and the cost faced by potential borrowers. This theory argues that a change in monetary policy will alter the external finance premium in the same direction. As a result of this additional policy effect on the external finance premium, the effect of monetary policy on the cost of borrowing and on real spending, as well as real activity, is amplified.

Why should policy shifts induced by the central bank have an impact on the external finance premium in credit markets? The credit view offers two distinct linkages arising from information problems in credit markets: those that operate through effects on firms' and households' balance sheets -- *a balance sheet channel* -- and those that operate through effects on bank lending -- *a bank lending channel.*[5]

Table 1: The Link Between Monetary Policy and Output

<table>
<tr><td colspan="4">Types of Monetary Transmission Channels According to the Credit View</td></tr>
<tr><td>Bank Lending Channel</td><td colspan="3">Balance Sheet Channel</td></tr>
<tr><td>M↑⇒bank deposits↑⇒bank loans↑⇒I↑⇒Y↑</td><td colspan="3">M↑⇒P_e↑⇒adverse selection↓, moral hazard↓⇒lending↑⇒I↑⇒Y↑</td></tr>
<tr><td></td><td>Cash Flow Channel</td><td>Unanticipated Price Level Channel</td><td>Household Liquidity Effects</td></tr>
<tr><td></td><td>M↑⇒ i↓⇒cash flow↑⇒ adverse selection↓, moral hazard↓⇒lending↑⇒ I↑⇒ Y↑</td><td>M↑⇒ unanticipated P↑ ⇒adverse selection↓, moral hazard↓⇒lending↑ ⇒ I↑⇒ Y↑</td><td>M↑⇒P_e↑⇒financial assets↑ ⇒likelihood of financial distress↓⇒ consumer durable and housing expenditure↑⇒ Y↑</td></tr>
</table>

M↑: expansionary monetary policy; I: investment spending; Y: GDP; P: price level; P_e: equity prices; i: interest rates

mechanism, not a truly independent or parallel channel.

5 See Table 1, which draws on Mishkin (1996), for a schematic presentation of the transmission of monetary policy according to the credit view.

The balance sheet channel stems from the fact that monetary policy has non-neutral effects on the balance sheet of firms. A tightening of monetary policy stance leads to a decline in the net worth of firms for two reasons. First, as contractionary monetary policy causes interest rates to rise, the servicing of outstanding debt becomes more expansive and firms experience decreasing cash flows. Second, rising rates are followed by declines in asset prices. As a result, the value of marketable collateral declines, and the wedge between the interest rates at which corporations can borrow and the yields on otherwise analogous risk-free assets rises. These adverse developments lead to more stringent conditions under which external finance becomes available. In practice, the external cost of finance rises, which ultimately causes interest-sensitive expenditures such as investment to decline.

A subset of the balance sheet channel, referred as *the cash flow channel*, operates through its effects on cash flow.[6] Expansionary monetary policy, which lowers the interest rate, also leads to an improvement in corporate balance sheets since it increases cash flow. The increase in cash flow improves the balance sheet in that it raises the liquidity of the firm (or household) and thus makes it easier for lenders to know whether the firm (or household) will be able to pay its bills. Consequently, the adverse selection and moral hazard problems become less severe, leading to an increase in economic activity.

The bank *lending channel* is based on the notion that banks play a special role in the financial system in that they are particularly well suited to solve asymmetric information problems in the credit market. Due to the special role of banks, certain borrowers will not have access to the credit markets unless they borrow from banks. As long as there is no perfect substitutability of retail bank deposits with other sources of funds, the operation of the bank

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6 To save space, unanticipated price level channel and household liquidity effects will not be discussed here. See Mishkin (1996) for a comprehensive discussion of these balance sheet channels.

lending channel of monetary transmission can be explained as follows. Relaxation of monetary policy, which increases both bank reserves and bank deposits, raises the quantity of bank loans available. Since many borrowers rely on bank loans to finance their activities, this rise in loans will lead to an increase in investment (and possibly consumer) spending. This implies that monetary policy shifts will have a greater effect on small and medium-sized enterprises (SMEs), that are relatively dependent on bank loans, than it has on large firms, that can directly access the credit market via stock and bond markets without going through banks.[7]

Box 1. What are the Adverse Consequences of Increases in Interest Rates?

A quick review of the literature points out three main categories of the adverse effects of increases in interest rates on both lending and aggregate economic activity.

First, as Stiglitz and Weiss (1981) demonstrated, asymmetric information and the resulting adverse selection problem can lead to credit rationing in which some borrowers are denied loans even when they are willing to pay a higher interest rate. Therefore, a higher interest rate leads to even greater adverse selection; because of the resulting increase in adverse selection, *banks will want to make fewer loans*, possibly producing a steep decline in lending that will lead to substantial decline in investment and aggregate economic activity.

Second, increases in interest rates have a significant impact on the balance sheets of both firms and households. As Bernanke and Gertler (1995) pointed out, a rise in interest rates, and therefore in households' and firms' interest payments, decreases firms' cash flow, which causes a deterioration in their balance sheets. This, in turn, makes it harder for lenders to know whether the firm or household will be able to pay its bills. Consequently, adverse selection and moral hazard problems become more severe for potential lenders to these firms and households, *leading to a decline in lending* and economic activity.

Third, increases in interest rates have an important effect on bank balance sheets. Since banks typically borrow short and lend long, a rise in interest rates directly causes a decline in net worth (the interest rate rise lowers the value of assets with longer duration more than it raises the value of liabilities with shorter duration). Therefore, even if the credit quality of banks were to remain unaffected, a rise in interest rates causes a decline in net worth which then leads to *a decline in bank lending*.

An additional reason for SMEs being disproportionately affected by credit channel effects emanates from the possibility that the monetary squeeze leads to a *flight to quality* in bank lending. More specifically, banks may respond to the monetary restriction, not only by restraining credit generally, but also by adopting more stringent lending policies vis-à-vis

7 See Gertler and Gilchrist (1994) for more on this.

customers that are perceived to be less credit worthy.[8] That is, when a deposit drain squeezes their resources, banks will attempt to select customers who are *ex ante* more credit-worthy: e.g. those having a more established credit record or those able to post more collateral.[9] As underscored by Bernanke, Gertler, and Gilchrist (1996), the flight to quality in bank lending may, in turn, trigger a *financial accelerator* effect along the following causal chain: the negative shock pushes the economy into a recession; the recession tightens borrowing constraints; tighter borrowing constraints amplify the recession, and the cycle goes on.[10]

The flight to quality in bank lending could also come in the form of banks' increasing their holdings of government securities in relation to their assets, in response to a tightening of monetary conditions. This, combined with the decrease in loans in relative to bank assets, is often interpreted as a sign of a declining bank willingness to extend new loans.

Finally, there are two additional factors causing SMEs to be disproportionately penalized by the credit channel effects. First, to the extent that the smaller banks are viewed as less likely to be bailed out by the Government, they may be the ones to suffer most in the deposit flight.[11] The fact that SMEs, more than other firms, typically rely on small bank lending implies that an additional credit squeeze may hurt them disproportionately.[12] Second, for a small firm, the cost of administering bankruptcy proceedings is larger, relative to the amount borrowed, than for a

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8 Bernanke, Gertler, and Gilchrist (1996) report evidence in line with this hypothesis. A negative bias similar to that regarding SMEs might apply to fast-growing firms, since they have a higher ratio of expected future profits to the current value of physical assets and thus can provide lower collateral.

9 Lenders perceive SMEs to be more risky since they generally have a shorter track record and typically release less --and less structured-- information.

10 See Kyiotaki and Moore (1997) for more on this. Lang and Nakamura (1995) report evidence of a flight to quality in bank lending in the US.

11 Kashyap and Stein (1994, 1997) contend that small banks, rather than large ones, are more likely to be hit by monetary restrictions.

12 Berger, Kashyap and Scalise (1995) demonstrate a strong correlation between relative size of the lending bank and relative size of the borrowing firm in the US: small firms tend to borrow from small banks and large firms tend to borrow from large banks.

large firm. Therefore, a rise in market interest rates will lead banks more than capital market lenders.

In a crisis situation, during which the relationship between monetary policy instruments and nominal income changes drastically, assessing the monetary policy stance becomes intricate. Consequently, it may be misleading to focus solely on key indicators of monetary policy when evaluating the monetary policy stance and credit conditions in order to detect "*a credit crunch*". Evaluation of monetary and credit aggregates must be accompanied with a more detailed investigation of the channels through which firms, banks, and households are affected by changes in monetary policy.

Box 2. Illustration of the Relevant Spreads

The following expression presents the set of interest rate spreads which capture the credit channel effects of the transmission mechanism of monetary policy:

$$SPR_0 = LR\text{-}TB = SPR_1 + SPR_2$$

where

LR = lending rate;
TB = Treasury bond rate;
SPR_1 = corporate bond rate - Treasury bond rate;
SPR_2 = lending rate - commercial paper rate;

The difference between rates on corporate and on Treasury bonds (SPR_1) measures the general risk premium as it is perceived by the market. If the balance sheet effect is at work, we expect that this spread will increase after the monetary restriction, reflecting the fact that private sector debt has become relatively riskier vis-à-vis sovereign debt.

The spread between the lending rate and commercial paper (SPR_2) is a proxy for the lending channel effect. The difference between lending rates and commercial paper rates quantifies the premium that bank-dependent borrowers must pay in order to raise external finance relative to those firms able to issue debt on the market. The lending channel effect contends that this spread will increase in the aftermath of the monetary squeeze.

Source: Domaç and Ferri (1998)

As widely acknowledged, a decline in either bank loans or a decline in their growth following a monetary tightening is not sufficient to pin down an adverse movement in banks' loan supply. This is because the decline could be induced either by the corporate sector

demanding less credit -- because fewer investments are undertaken -- or by bank reluctance to lend. By contrast, if the decline in (the dynamics of) bank loans -- *a quantity variable* -- is coupled with a widening of the spread between bank lending rates and interest rate on non-bank debt (See Box 2) -- *a price based variable* --, then it can be argued that an adverse shift in the bank supply of loans is curtailing credit. In fact, such a situation is consistent with only two possibilities: either supply has declined whereas demand has not, or supply has declined more than demand has.

3. Descriptive Analysis of the Credit and Monetary Conditions in the Aftermath of the Crisis

Many years ago, Irving Fisher (1933) emphasized the interaction of debt and speculation in describing business and credit cycles:

> *Thus, over-investment and over-speculation are often important; but they would have far less serious results were they not conducted with borrowed money. That is, over-indebtedness may lend importance to over-investment or to over-speculation. The same is true as to over-confidence. I fancy that over-confidence seldom does any great harm except when, as, and, if, it beguiles its victims into debt.*

The excessive credit growth became particularly acute in Malaysia during 1995-97 (Figure 1).[13] The Central Bank, in fact, considered the expansion of loans to be excessive but, in light of the potentially adverse consequences on highly leveraged Malaysian corporations, was reluctant to respond by raising the intervention rate. In October of 1997, the Central Bank responded to the excessive credit growth by issuing a directive to limit the growth of credit lines on the grounds that it might have less serious consequences than increasing the interest rates. The adoption of

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[13] Excessive credit growth (EXCR) is calculated as:

$$EXCR_t = \frac{\Delta D_t}{M_{t-1}} - \Delta \log y_t$$

where Δ is the first difference operator, D, M, and y are, respectively, the total domestic credit, the broad money stock, and the real GDP . This measure assumes that money demand has a unitary elasticity with respect to real income.

this directive also seems consistent with the fact that Malaysia increased its intervention rate less than other crisis countries did (Figure 2). With the benefit of hindsight, it is quite likely that this directive played -- *possibly by causing banks to over-react in the wake of the crisis* -- a role, both in curtailing the availability of credit and in increasing lending rates relative to other market rates.

Figure 1. Excess Domestic Credit Growth

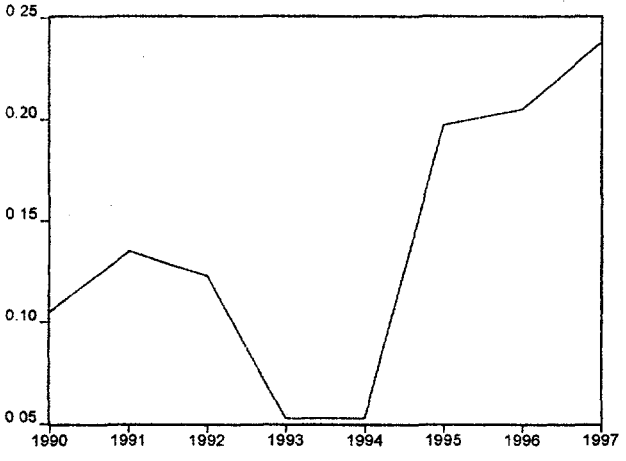
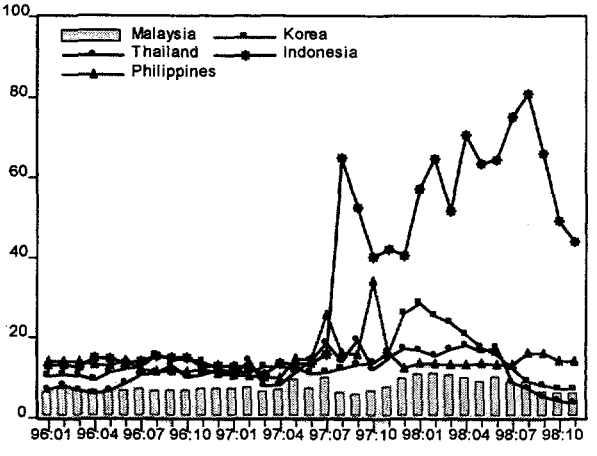


Figure 2. Evolution of Overnight Rates



In line with the authorities' efforts to invigorate the economy by engineering an increase in domestic demand, interest rates have declined noticeably (Figure 5). Despite the marked decline, the annual growth rate of loans has remained anemic and, indeed, turned negative in real terms in September (Figure 3). Although this observation appears, at first blush, to imply that the slow-down in lending largely emanates from the demand side, several comments are in order.

First, the base lending rate is more reflective of administered changes and more representative of the lending rate charged to prime-customers. The average lending rate incorporates the lending rate that is charged to borrowers perceived to be more risky. Accordingly, an increasing spread between the latter and the former implies that banks are still

reluctant to extend new loans (Figure 6). [14] In fact, this observation suggests that the adverse selection problem has become more severe in recent months.

Figure 3. Growth Rate of Real Loans (year-on-year)

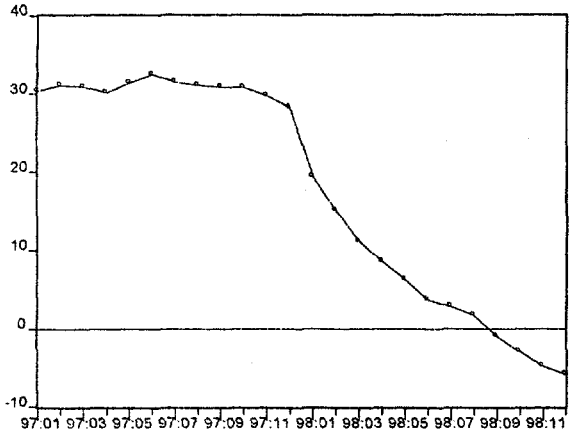


Figure 4. Growth Rate of Real Loans by Type of Banks

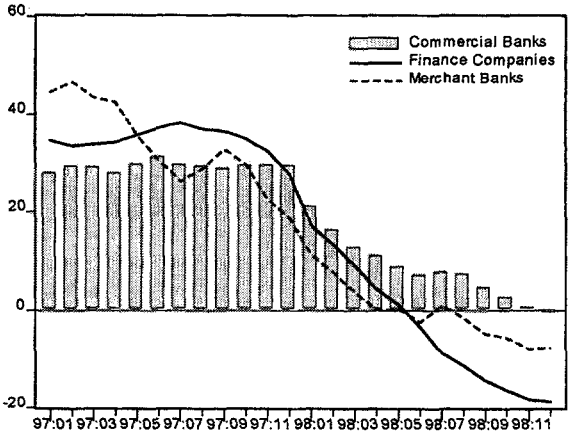


Figure 5. Evolution of Average Lending rate

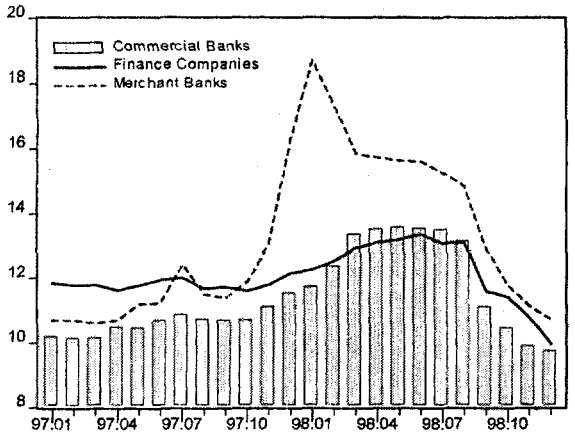
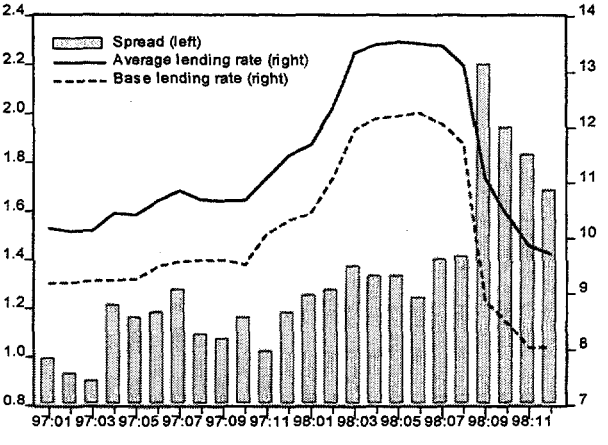


Figure 6. Average Lending Rate and Base Lending Rate



Second, the increasing share of revolving credit and overdraft in total loans suggests that borrowers are relying more on shorter term and generally pre-committed facilities. This, combined with the sharp decline in lending activity, further underscores bank reluctance to

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[14] The base lending rate (BLR) for commercial banks is calculated as:

$$BLR = [\frac{IR}{1 - SRR\%} * 80\%] + 2.25\%$$

where IR and SRR are the Central Bank intervention rate and statutory reserve requirement. Prior to September 1, 1998 the BLR was computed using average KLIBOR in lieu of the intervention rate and the fixed administrative charge was 2.5% instead of 2.25%.

extend new loans (Figure 7). In addition, to the extent that shorter-term and pre-committed facilities are utilized mainly by large firms, as was shown by Ellihausen and Wolken (1990), SMEs without commitments may find themselves served last, if at all.

Figure 7. Share of Revolving Credit and Overdraft in Total Loans

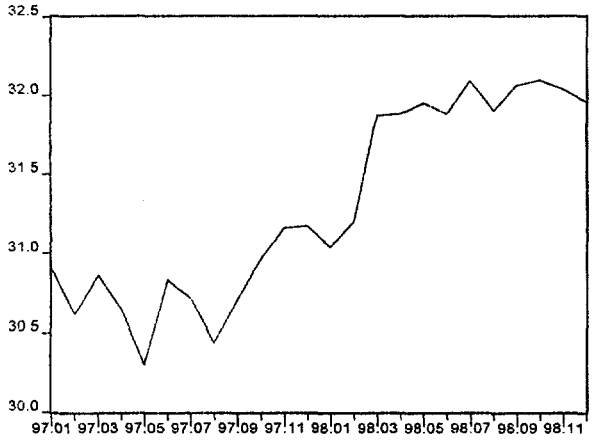


Figure 8. Share of Securities in Commercial Banks' Total Assests[a]

a: Domestic Commercial Banks

Third, available evidence also suggests that there has been *a flight to quality* -- a re-allocation of banks assets towards government securities away from lending to the corporate sector. As can be seen from Figure 8, banks have increased their holdings of government securities in relation to their total assets since January 1998 -- a sign of declining bank willingness to lend as banks devote an increasing share of their assets to securities.

Fourth, a reshuffling of deposits across banks took place as depositors enacted a *flight to quality*. The flight to quality took place from finance companies and merchant banks to commercial banks (Figures 9-11). Perceived by depositors to be less likely to fail, foreign banks also experienced an inflow of deposits from domestic banks between December 1997 and January 1998. The flight from domestic to foreign banks has been less pronounced: the market share of foreign banks in total deposits has increased from 20.9 percent in January 1997 to 21.5 percent in December 1998, reaching its peak of 23.1% in January 1998 (Figure 12). To the

extent that some customers were exclusively borrowing from those banks that experienced a deposit flight, at least temporarily, such borrowers may have found it particularly difficult to obtain new credit. In fact, at a time of heightened corporate risk and of tight liquidity, banks are very likely to turn down new credit applicants with whom they do not already have an established customer relationship.

Figure 9. Fixed Deposits at Commercial Banks[a]

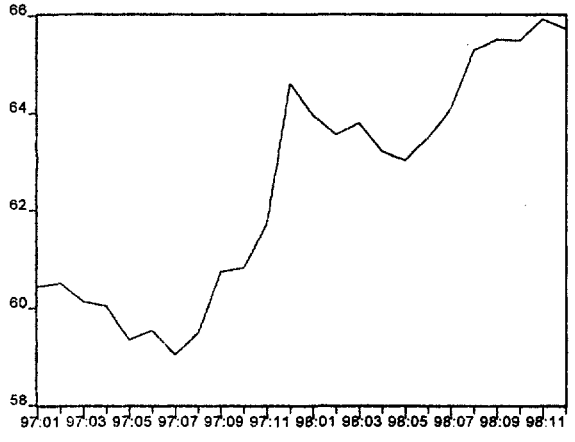


Figure 10. Fixed Deposits at Merchant Banks[a]

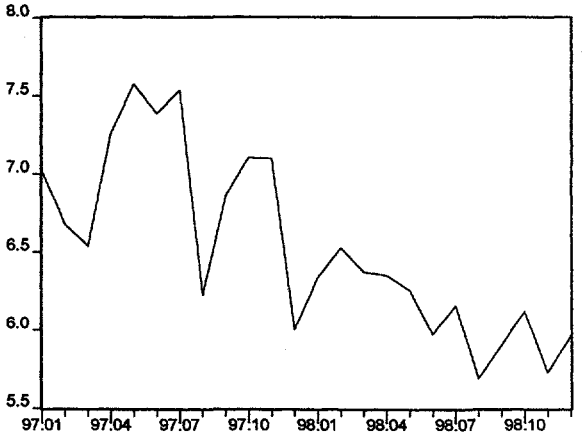
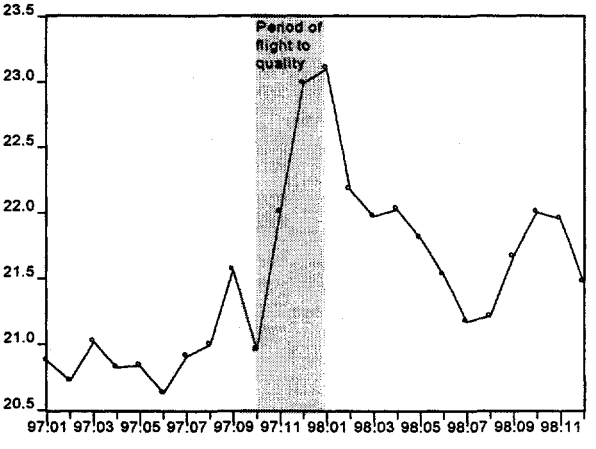


Figure 11. Fixed Deposits at Finance Companies[a]

Figure 12. Share Foreign Banks in Total Bank Deposits

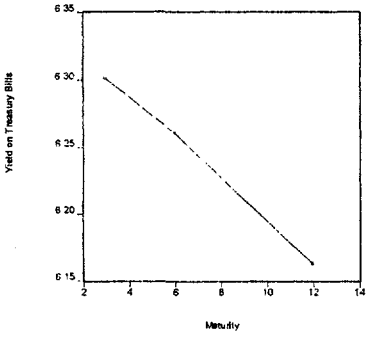


a: (% share in the total)

Fifth, evolution of the yield curve, particularly beginning with September 1997 and throughout 1998 (see Box 3), suggests that economic agents expect short-term rates to increase (or they expect future monetary tightening) as demonstrated by the steep upward slope of the yield curve.

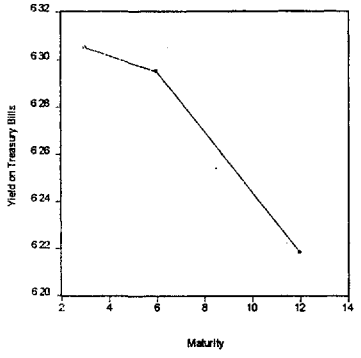
Box 3. Evolution of the Yield Curve

Yield Curve as of January 1997



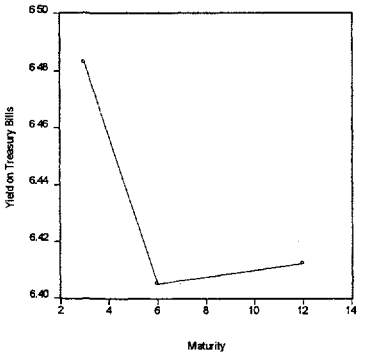
Short-term interest rates expected to fall

Yield Curve as of March 1997



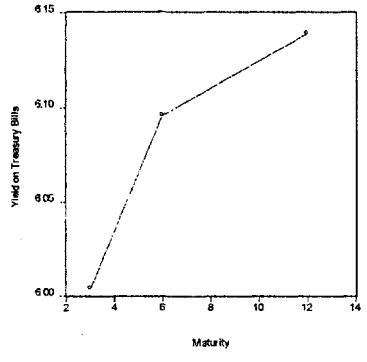
Short-term interest rates expected to fall

Yield Curve as of June 1997



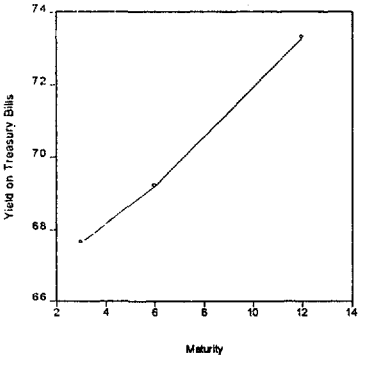
Short-term interest rates expected to fall

Yield Curve as of September 1997



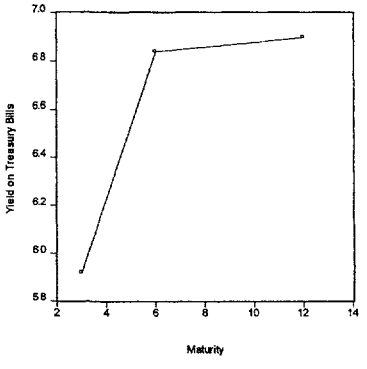
Short-term interest rates expected to rise

Yield Curve as of December 1997



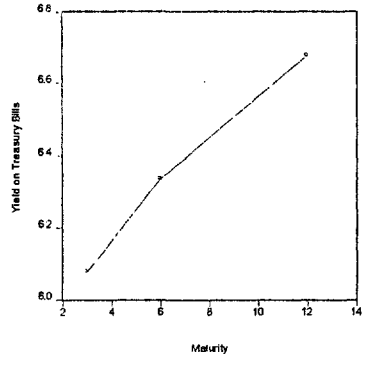
Short-term interest rates expected to rise

Yield Curve as of January 1998



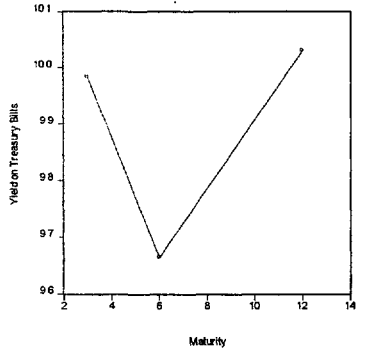
Short-term interest rates expected to rise

Yield Curve as of March 1998



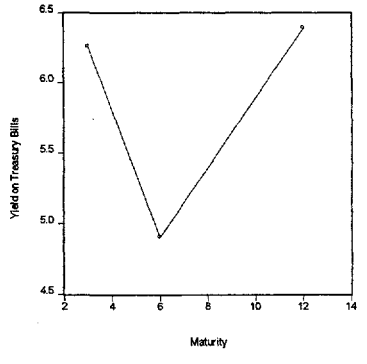
Short-term interest rates expected to rise

Yield Curve as of June 1998



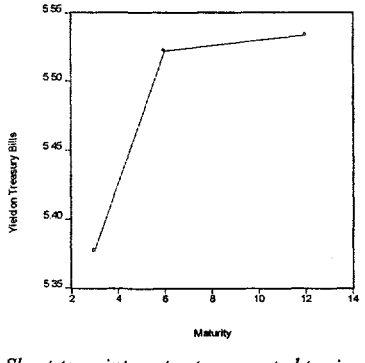
Short-term interest rates expected to rise

Yield Curve as of September 1998



Short-term interest rates expected to rise

Yield Curve as of December 1998



Short-term interest rates expected to rise

The steepening of the yield curve is also consistent with a future decline in economic activity.[15] Indeed, the information content reflects the expected effects of monetary policy via interest rates on economic activity. The expectation of future decline in economic activity, in turn, should have an adverse effect on lending activity. Although the relationship between monetary policy actions and the term structure is unlikely to remain invariant over time, and may be affected by other factors such as changes in expected inflation and in the real ex ante long-term rate, the present situation may be explained in either one of two ways: either agents view current declines as insufficient to revive economic activity or they do not view policy actions as effective.

Finally, as was explained previously, a decline in loan growth or in the lending rate by itself is insufficient to determine whether the decline in bank lending arises from a shift in either demand or supply. The evolution of the lending activity should be accompanied with that of the spreads presented in Box 2.[16] Although the spread between the average lending rate and the 3-month T-bill (Figure 13), *which captures both the general risk premium and the bank dependent borrowers' specific spread*, has declined in recent months, it is still above pre-crisis levels.[17] More precisely, in the case of commercial and merchant banks, the spread reached its historic peak during the earlier part of 1998, before declining towards the end of 1998. It still remains, however, well above the pre-crisis period. The spread in the case of finance companies rose in March 1998 and, thereafter, exhibited a downward trend. Overall, the increase in the spread in the case of finance companies is less pronounced compared to that of commercial and merchant banks.

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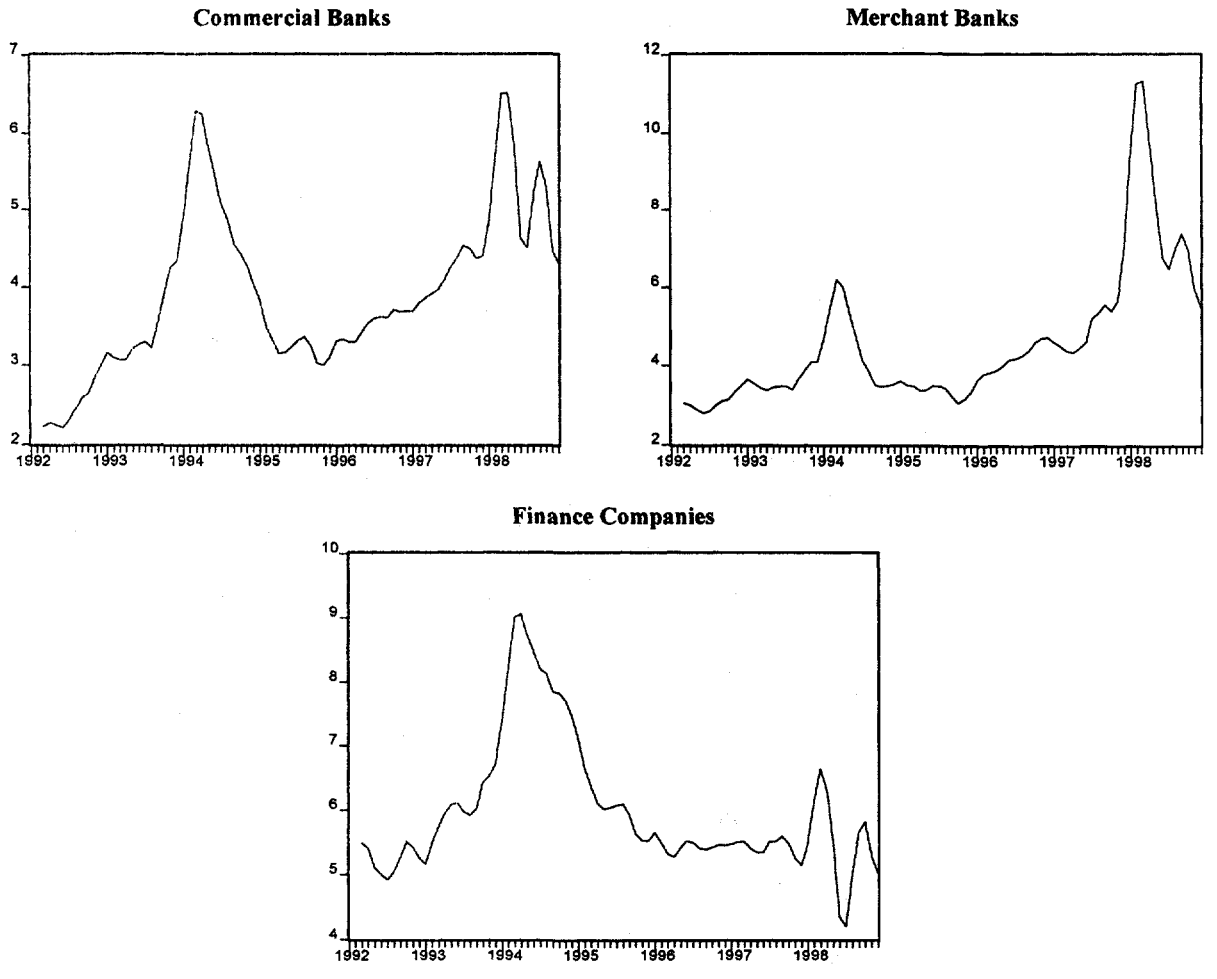
15 See Estrella and Mishkin (1995) for more on the role of the term structure in the conduct of monetary policy.

16 Indeed, numerous studies demonstrated that increases in the interest rate between risky and safe debt are associated with subsequent downturns in output [see, for example, Stock and Watson (1989) and Friedman and Kuttner (1989)]. Consequently, the behavior of the spread also has implications for economic activity.

17 Put differently, an increase in this spread can also be interpreted as a tightening in the terms of external finance.

Figure 13. Spread between Lending Rate and 3-Month T-bill Rate [18]



The overall analysis combining the evolution of the spread -- the price variable -- and that of the lending activity -- the quantity variable -- along with the other key indicators of the framework suggests the following: (i) evolution of the spread between risky and safe debt implies that "payoff" or "default" risk is still well above its pre-crisis level, thus underscoring the increased agency costs of external finance; (ii) the decline in lending activity between the end of 1997 and first half of 1998 can be explained by the reduction in bank credit supply relative to demand; (iii) it appears that the decline in demand has probably played a more prominent role in

[18] Three-month moving average.

contributing to the sharp slow-down in lending activity during the second half of 1998 compared to the earlier period; (iv) the sharp decline in the growth rate of loans by finance companies -- which in part can be attributed to closures -- when combined with relatively moderate increase in the spread, can be interpreted as the decline in demand contributing to the slow-down in lending activity more than in the case of commercial and merchant banks; and (v) customers borrowing exclusively from banks that experienced deposit flight, *namely merchant banks, finance companies, and, for a very short period, domestic banks*, are likely to find it more difficult to acquire new credit. Considering that SMEs usually have a customer relationship with only a single bank, while large firms usually have customer relationships with several banks, the latter can typically find a bank that is able to make loans. Thus, it is quite possible that the phenomenon of deposit flight will hurt SMEs disproportionately.[19]

4. Empirical Framework and the Main Results

4.1. Background

A growing body of research -- mainly on the industrialized countries -- has established the empirical significance of credit market imperfections and has provided evidence on dispropotionate effects of monetary policy changes on bank-dependent borrowers. More spefically, this strand of the literature has demonsted that the informational frictions that add the costs of external finance apply largely to younger firms and firms that are not well collaterlized. On average, these are small firms [Gertler and Gilchrist(1994)]. Smaller firms depend heavily on intermediary credit, while large firms make far greater use of direct credit, including equity, public debt, and commercial paper [see Gertler and Hubbard (1988)]. Morever, beginning with a

[19] Beyond the possible discrimination against SMEs, there may be particularly severe discrimination against newly founded firms. In a period when credit is tight, banks are unwilling to take on new loan customers, so that people who want to start new firms often cannot obtain credit.

study conducted by Fazzari, Hubbard, and Peterson (1988), a large number of investigations on investment have highlighted that smaller firms are more likely to face liquidity constraints.

These findings, in turn, imply that monetary policy shifts have an important distributional aspect that cannot be tackled within the traditional money view.[20] Furthermore, since smaller and faster growing firms are likely to be firms with highly profitable investment opportunities, the fact that they bear a disproportionate share of the burden imposed by a recession has serious consequences for social welfare: not only are recessions associated with both aggregate output and investment declines, but the declines themselves are inefficient.

While the largest industrialized countries have been the subject of the above mentioned studies, very little work has been conducted to investigate the validity of distributional consequences of monetary policy shifts for developing countries.[21] This section attempts to fill an important void by investigating whether monetary policy shifts have a greater influence on the production of small and medium sized manufacturing firms than on that of larger firms in one such developing country, Malaysia.

The first step of the empirical investigation is to construct a reasonable proxy for the production of small and medium sized as well as large manufacturing firms. To this end, the paper relies on the information published by the Federeation of Malaysian Manufacturers (FMM) on small and medium sized industries (SMIs) and on industrial surveys conducted by the Department of Statistics. Appendix 1 presents both information on SMIs in Malaysia as well as the compostion of manufacturing component of the industrial production. Available information suggests that the majority of SMIs operate in: (i) food and beverages; (ii) fabricated metal products; (iii) wood and wood products; and (iv) basic metal. Using the corresponding weights

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[20] See Cecchetti (1995) for more on this.

of these components from Table A1 of Appendix 1, the paper calculates the production of SMIs, while the production of large industries is calculated by using the remaining components and their corresponding weights.

Figures 14 and 15 illustrate the evolution of the constructed series for the production of SMIs and large manufacturing firms (LMFs). It is clear that the downward trend in production is more prominent in the case of SMIs compared to that of LMFs. Indeed, the growth rate in the index averaged over 1997 and 1998 for SMI production is almost –1.4 percent, while that of large industries is around 1.8 percent.

Figure 14. Index of SMI Industrial Production

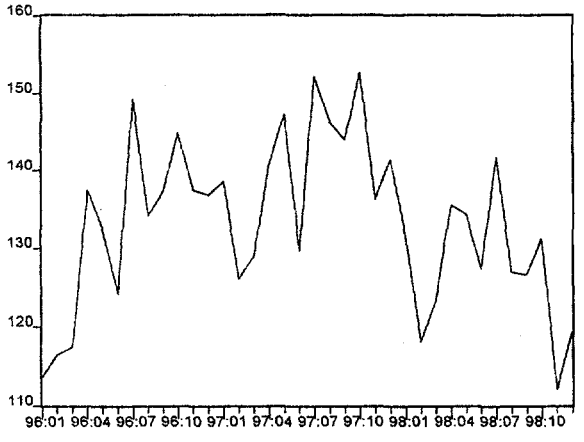

Figure 15. Index of Large Industries Industrial Production

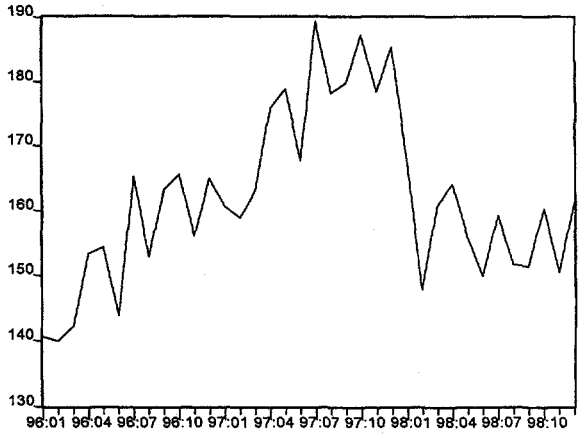

Table 2 also presents descriptive statistics of respective index of SMIs and large industries between 1992:01 and 1998:12. It is interesting to note that the variability of SMIs' production is almost twice as much as that of large industries, as demonstrated by the coefficient variation. A possible explanation for this phenomenon is provided by Gertler and Gilchirst (1994) who

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21 A recent study by Domaç and Ferri (1998) on Korea concluded that SMEs suffer more than other businesses do from the adverse effects of the credit channel.

suggest that large firms smooth the impact of variation in demand by contracting out to SMIs in good times, but servicing all business internally in economic downturns.

Table 2. Descriptive Statistics of Manufacturing Production (1992:01-1998:12)[a]

	Large Manufacturing Firms	*SMIs*
Mean	0.71	0.51
Median	-0.18	-0.25
Maximum	16.75	18.76
Minimum	-14.83	-16.39
Standard Deviation	6.28	8.22
Skewness	0.19	0.21
Kurtosis	2.86	2.58
Coefficient Variation	8.85	16.10
Jarque-Bera	0.59	1.23
Observations	83.00	83.00

a: Growth rate of the respective index.

4.2. Responses to Policy Shocks by SMIs and Large Manufacturing Firms: Evidence from Vector Autoregressions

Quantifying the effects of monetary shocks has been one of the most significant challenges of empirical monetary economics. Economic research has historically employed several competing approaches to identify policy effects from the observed data. On the one hand, there are techniques based on the Choleski decomposition of vector autoregression (VAR) residuals. Within this approach, the main debated issue pertains to whether an indicator of monetary policy exists which can justifiably be placed within a Wold-causal ordering. On the other hand, the approach proposed by Romer and Romer (1989, 1990) uses episodes viewed as monetary contractions as a means of identifying monetary shocks. Here the key issue causing

disagreement is whether such episodes can be reasonably considered exogenous with respect to other shocks to the economy.[22]

Since the seminal work of Sims (1980), VAR models have become an increasingly popular tool for empirical studies of the monetary transmission mechanism. [23] A VAR is a system of ordinary least-squares regressions, in which each of a set of variables is regressed on lagged values of both itself and the other variables in the set. VARs have proved to be a convenient method of summarizing the dynamic relationships among variables, since once estimated, they can be used to simulate the response over time of any variable in the set to either an "own" disturbance or a disturbance to any other variable in the system.

This paper, in line with the general convention in the empirical literature on the transmission of monetary policy, also employs a VAR model. The basic strategy for identifying an exogenous shock to monetary policy is to focus on the disturbance term in the following regression equation:

$$S_t = \psi(\Omega_t) + \sigma\varepsilon_{st} \qquad (1)$$

Where S_t stands for the policy instrument; ψ is a linear function; Ω_t summarizes the information set that the Central Bank considers when determining S_t; σ is a positive number; and finally ε_{st} is a serially uncorrelated shock that is orthogonal to the elements of Ω_t and has unit variance. The information set consists of the past history of all variables in the system and the time t realizations of subset of those variables. The dynamic response of a variable to a monetary

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22 Evaluation of these competing approaches is beyond the scope of this paper. Interested readers, however, should refer to Chirstiano, Eichenbaum, and Evans (1996a, 1996b), Zha (1997), and Reifschneider, Stockton and Wilcox (1997).

23 See Watson (1994) as well as Reifschneider, Stockton and Wilcox (1997) for a comprehensive discussion on the use of VARs and the role of econometric models in the conduct of monetary policy.

policy shock can be captured by the coefficients in the regression of the variable on current and lagged values of the fitted residuals in the above equation.[24]

Following Bernanke and Blinder (1992), Chirstiano, Eichenbaum and Evans (1996a, 1996b), and others, the paper employs the short-term interest rate, namely the *overnight money rate* (R), which is under the direct influence of the Central bank, as an indicator of the stance of monetary policy.[25] Consequently, the disturbances to the overnight money rate equation in the VAR are identified as shocks to monetary policy. The response of other variables in the system to an interest rate shock is interpreted as the structural responses of those variables to an unpredicted shift in monetary policy.

More specifically, the VAR system in the case of SMIs (in the case of LMFs) includes the log of SMI production [Y^{SMI}] (Y^{L}) along with the log of real effective exchange rate [RER], overnight money rate [R], and the spread between the average lending rate and the 3-month T-bill rate [SPR], in that order.[26] This ordering, consistent with the Central Bank's behavior in practice, assumes that the monetary authority looks at the contemporaneous state of real economic activity (Y^{SMI} or Y^{L}) as well as the real effective exchange rate (RER) before deciding on ε_{st}.[27] The spread between the average lending rate and the 3-month T-bill rate (SPR) is

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24 See Chirstiano, Eichenbaum, and Evans (1996b) for a detailed technical exposition of this strategy.

25 In defining the transmission mechanism, exogeneity of monetary instrument is important in two senses: one economic and one econometric. In an economic sense, the monetary policy instrument must, at the margin, be controllable by the Central Bank: the endogenous response of the instrument to developments in the economy must take place merely via the Central Bank's reaction function. Exogeneity, in the econometric sense, entails that enough restrictions be imposed upon the system to allow the identification of the Central Bank's reaction function and the shocks pertaining to it.

26 There is an issue of whether the variables in a VAR need to be stationary. Sims (1980) and others recommend against differencing even if the variables contain unit root. They contend that the goal of a VAR analysis is to determine the interrelationships among the variables, not to determine estimates. The main argument against differencing is that it "throws away" information concerning the co-movements in the data. Although the results of the Phillips-Perron stationarity tests indicate that variables involved are integrated order of 1, I(1), following the argument put forth above, variables are not differenced. By not imposing co-integrating relations, the estimation avoids a long-run identification problem, which may be in principle difficult to solve, with no loss of information on the long-run properties of the system, incurring some loss due to the reduced efficiency of estimation but at no cost in terms of consistency of estimators. See Sims et al. (1990) for more on this.

27 The empirical results are qualitatively the same when R is ordered last.

included to capture the impact of the changes in the terms of external finance (or the combined impact of the balance sheet and lending channel effects) on economic activity (see Box 2). It should be noted that the variable SPR understates the actual magnitude of this effect since the average lending rate would not entirely capture the increase in cost to the typical bank borrower, as fewer borrowers qualify for this rate during tight money episodes.

The VARs are estimated using monthly data from 1992:01 to 1998:12, including 12 lags of the relevant quantitative variables.[28] The estimated VAR coefficients are not in themselves very interesting and thus are not reported here. Instead, the impulse response functions and the variance decompositions are reported. In order to assess the overall quantitative impact of a monetary tightening and the credit channel effects on production of SMIs relative to LMFs, Figures 16 and 17 plot the impulse response functions of Y^{SME} and Y^{L} with respect to innovations in the interest rate and the spread residuals over a horizon of 36 months (Appendix 2 reports the overall results of this exercise). Standard errors are calculated by the Monte Carlo method, with 1000 repetitions and standard error bands (of $\pm$ 2 standard deviations) are also included.[29]

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28 All data are obtained from the Central Bank, Department of Statistics, and JP Morgan. In terms of lag selection, a sequence of (likelihood ratio) exclusions tests favored 12 lags against 10 and 8 lags.

29 The Monte Carlo standard errors are computed as follows. At each repetition, a random sample from the asymptotic distribution of the VAR coefficients is drawn. The asymptotic distribution of the VAR coefficients is given in Hamilton (1994). From these simulated coefficients, the impulse response functions are computed. After repeating this process 1000 times, the 95% confidence interval, by the percentile method, is constructed. The standard errors reported are the standard deviations of the simulated impulse responses across 1000 replications.

Figure 16: Impulse Response Functions: Large Manufacturing Firms

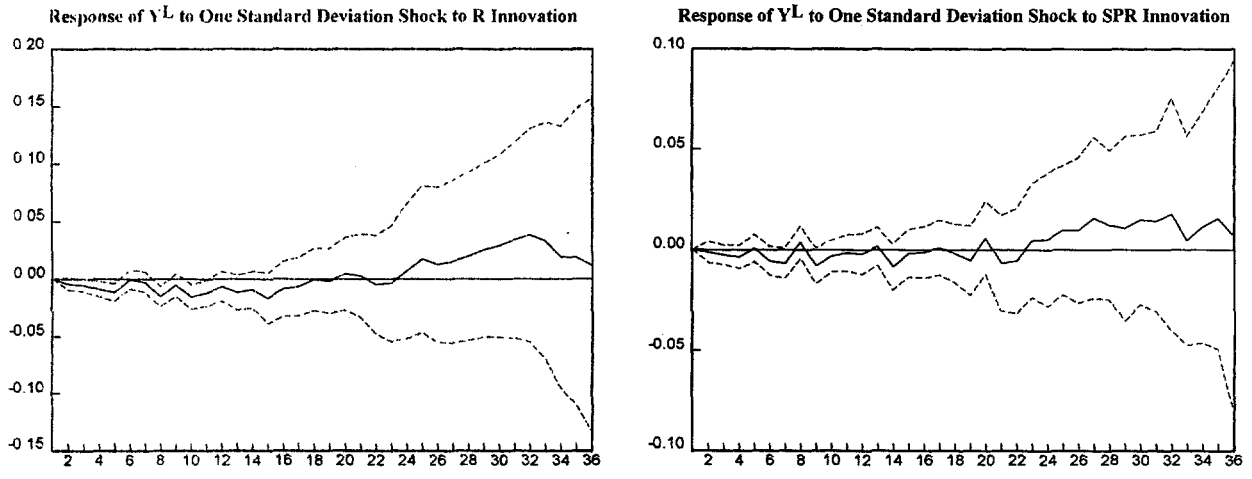
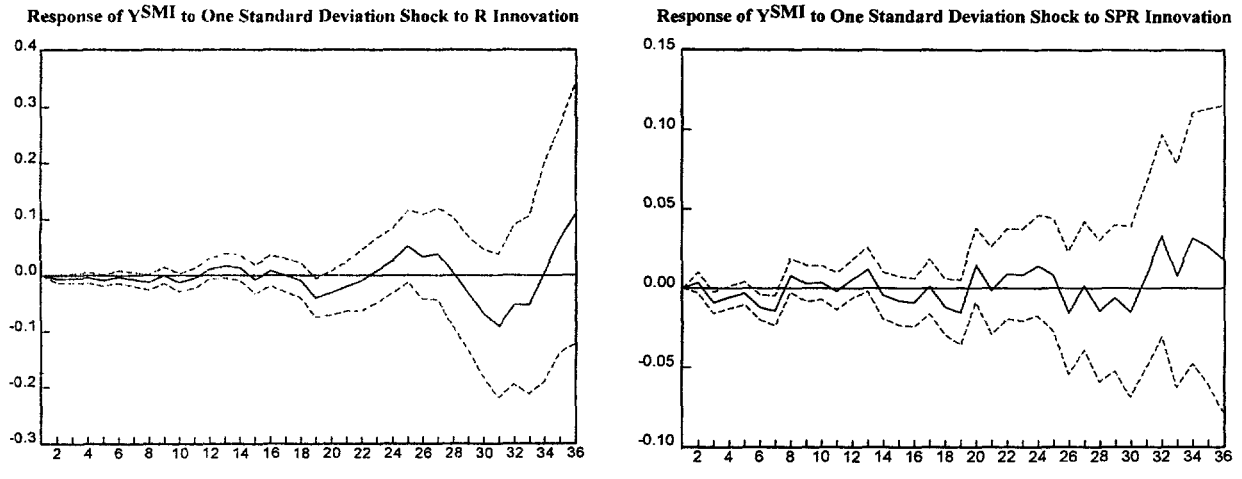


Figure 17: Impulse Response Functions: SMIs



Impulse response functions of Y^{SMI} and Y^{L} with respect to R and SPR suggest that shocks in R and SPR have larger effects on SMIs.[30] More specifically, the effect of monetary policy shock has the largest statistically significant adverse impact on Y^{L} after ten months: *a 1 percent standard deviation shock to R reduces Y^{L} by around 1.6 percent.* After roughly one year, the

30 Since the variables are in logs, the impulse responses have the interpretation of cumulative growth rates relative to base, except interest rates which can be interpreted as percentage point movements relative to base.

effect of the monetary impulse on Y^L dies away. Monetary shocks have a negative and statistically significant impact on Y^{SMI} in the first ten months and, thereafter, they are statistically insignificant until the nineteenth month. Indeed, Y^{SMI} experiences the largest decline following a monetary shock after nineteen months: *a 1 percent standard deviation shock to R reduces Y^{SMI} by roughly 4 percent.* The effect of the monetary impulse on Y^{SMI} dies away after twenty months.

Adverse effects of SPR shocks on economic activity occur faster than those of R shocks. A one standard deviation shock to SPR has the largest statistically significant impact on Y^L after 9 months, at which point Y^L declines by 0.8 percent. However, SPR shocks do not have any statistically significant effect on Y^L after nine months. On the other hand, the largest statistically significant decline in Y^{SMI} in response to a one standard deviation shock to SPR takes place even earlier, after seven months, at which point Y^{SMI} decreases by 1.4 percent. The effect of SPR shocks on Y^{SME} dies away after 13 months.

Variance decompositions lend further support to the disproportionate effects of monetary policy on Y^{SMI}.[31] Looking at a decomposition of the forecast error variance of production of both SMI and LMFs over a 36-month horizon, indicates that almost 71 percent of the forecast error variance of Y^{SMI} can be accounted for by shocks to interest rates, whereas the corresponding contribution for Y^L is around 30 percent (Figures 18 and 19). SPR shocks contribute roughly 8 percent and 10 percent of the forecast error variances of Y^L and of Y^{SMI}, respectively.[32] The results also indicate that Y^L explains almost 60 percent of its forecast error variance, whereas Y^{SMI} explains nearly 12 percent of its forecast error variance. It is also

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31 The forecast error variance decomposotion indicates the proportion of the movements in a sequence due to its "own" shocks versus shocks to the other variables.

32 Once again, it should be noted that since the variable SPR is likely to understate the magnitude of credit channel effects due to the reason previously explained, the results are likely to be biased toward finding relatively larger contribution of R shocks to forecast error variances of both Y^{SMI} and Y^L than those of SPR shocks.

• interesting to note that RER shocks explain only 3 percent of the forecast error variance of Y^L, while they explain nearly 10 percent of the forecast error variance of Y^{SMI}.

Figure 18. Variance Decompositions: Large Manufacturing Firms

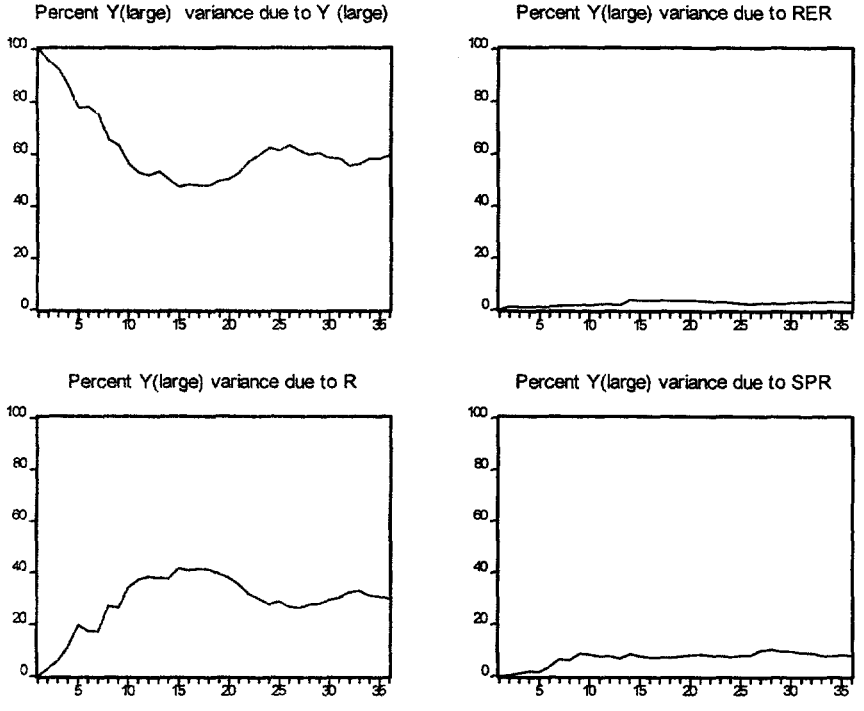
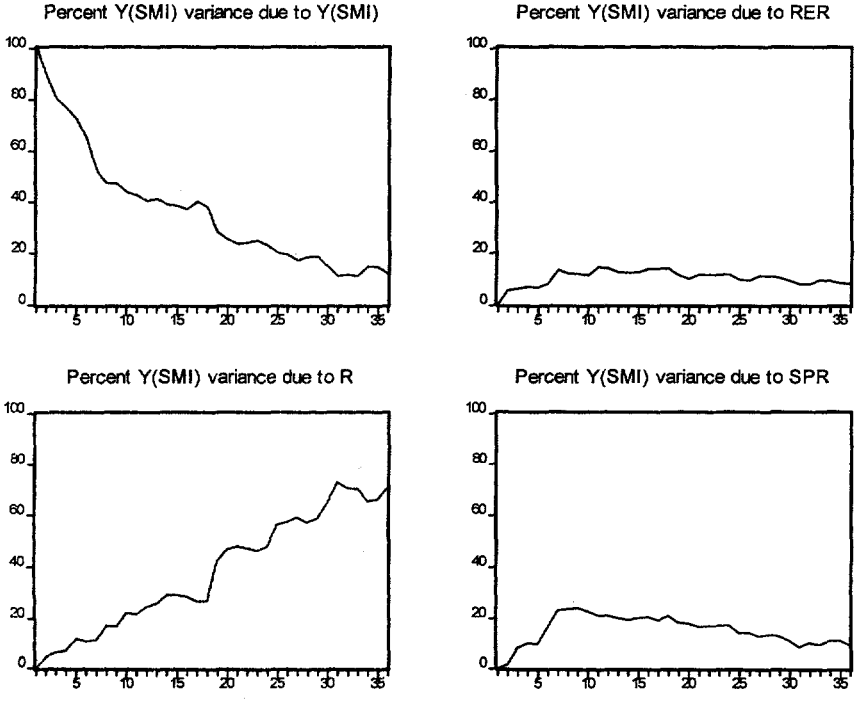


Figure 19. Variance Decompositions: SMIs



The implications of the empirical analysis can be summarized by the following: (i) monetary policy shocks have a larger effect on the production of SMIs compared to that of LMFs; (ii) the effect of monetary impulse on the production of SMIs dies away more quickly than that of SMIs (after twelve months versus after twenty months); (iii) SPR shocks capturing the credit channel effects on economic activity also have a larger impact on the production of SMIs; their impact, however, is quantitatively smaller than that of monetary shocks;[33] and (iv) variance decompositions also provide further support to the disproportionate effects of monetary policy on SMIs: R and SPR shocks contribute substantially more to the 36-month variance of the production of SMIs.

Therefore, the empirical results underscore that SMIs suffer disproportionately from monetary shocks.[34] This finding confirms earlier studies, mainly on industrialized countries, [Oliner and Rudebusch (1992) and Gertler and Gilchirst (1994)] and provides further support to the notion that *SMIs face greater market imperfections, which in turn amplifies the effects of a given policy shift.* Since SMIs are likely to be firms with highly profitable investment opportunities, this finding has important policy implications for social welfare. Not only do recessions cause a decline in aggregate output and investment, but the declines themselves are inefficient.

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33 It needs to be reiterated that since the variable SPR is likely to understate the magnitude of credit channel effects, the procedure seems clearly biased toward finding relatively larger R shocks than SPR shocks;

34 It is possible that non-financial factors might also account for the differences in small and large firm behavior after tight money. A host of studies quoted in this paper, however, has demonstrated that balance sheet liquidity constrains the spending of smaller firms, particularly around episodes of tight money; while the same is not true for large and high grade companies. All this suggests that financial factors are at work.

5. Conclusions

This paper aimed to accomplish two goals. First, it intended to provide a brief descriptive analysis of Malaysian credit and monetary conditions in the aftermath of the crisis. Second, it aimed to empirically investigate the response of small and medium size industries (SMIs) as well as large manufacturing firms (LMFs) to monetary policy shifts in Malaysia in order to shed light on the distributional consequences of monetary policy actions.

The results from the descriptive analysis suggest that "payoff" or "default" risk, *as captured by the spread between risky and safe debt*, is still well above its pre-crisis level, thus underscoring the increased agency costs of external finance. The analysis underscores that the decline in lending activity between the end of 1997 and the first half of 1998 can be attributed to the reduction in bank credit supply relative to demand. It appears that the decline in demand has probably played a more prominent role in contributing to the sharp slow-down in lending activity during the second half of 1998, compared to the earlier period. The descriptive analysis also suggests that customers borrowing exclusively from banks that experienced deposit flight, *namely merchant banks, finance companies, and for a very short period domestic banks*, are likely to find it more difficult to acquire new credit. Indeed, this implies that the phenomenon of deposit flight hurt SMIs disproportionately, as they are likely to have a customer relationship with only a single bank.

The results of the empirical investigation suggest that monetary tightening has a larger impact on SMIs than it does on LMFs. The empirical findings point out that the effect of monetary shocks on production is more persistent for SMIs than for LMFs. Moreover, monetary shocks, over a 36 month horizon, contribute substantially more to the variance of the production of SMIs than that of large manufacturing firms: *71 percent versus 30 percent.* Therefore, the empirical results lend support to the existence of credit market imperfections and underscore the

importance of distributional consequences of policy shifts. More specifically, the findings corroborate the notion that *SMIs face greater market imperfections which, in turn, magnify the effects of a given policy shift.*

There are two main policy implications emerging from the thrust of the overall findings. First, policy makers should take distributional consequences of policy actions into account in their decision making process. The finding that SMIs bear a disproportionate share of the burden of monetary contraction has serious implications for social welfare. The fact that SMIs account for more than 80 percent of total manufacturing establishments and that they contribute, respectively, 13.8 percent and 17.4 percent of total output and employment combined with the favorable evidence on their efficiency relative to large firms suggests the following: *not only do aggregate output and investment decline in response to monetary contractions, but the declines themselves may be inefficient.*[35]

Second, since the empirical findings lend support to the idea that SMIs face greater market imperfections, there could be benefits in providing assistance to SMIs which disproportionately suffer from asymmetric information problems. This recommendation is, in fact, consistent with the authorities' effort to assist SMIs through various schemes: a general policy recommendation in this respect would be to consider measures to alleviate information asymmetry in credit markets.[36] To this end, the promotion of SME cooperative or mutual guarantee schemes that reduce information asymmetry in credit markets can prove useful.[37] Mutual guarantee schemes have been widely used in Southern Europe by groups of firms -- usually within a specific industry -- to provide a privately organized "insurance system" for lending banks, thus enabling

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35 See Ghosh and Chinn (1994) and Rosli (1996) on the relative efficiency of SMIs and large firms.

36 Although investigation of the effectiveness of these schemes is an important issue, it is beyond the scope of this study.

37 See Hughes (1997) for more on this.

the banks to rely less on the assets of individual companies within the group in making loan decisions. The pooling effects of this system, in turn, reduce the risk to the bank of default, thereby decreasing informational asymmetries between the banks and the firms. This market based solution provides, not only a guarantee, but also an incentive for an individual member of these mutual societies to reveal information to the society that they would hesitate to provide to the bank.

Finally, the debate over whether or not the monetary tightening was excessive in the crisis countries has so far overlooked the asymmetric effects of monetary policy. A myriad of studies has succeeded in establishing the empirical importance of the asymmetric effects of monetary policy on output and prices.[38] This strand of literature has demonstrated that negative shocks affect output more strongly in absolute terms than positive shocks do. To the extent that this also holds for Malaysia and for the other crisis countries, neglecting this aspect of monetary policy might have contributed to an economic recovery that has been slower-than-expected.

[38] See, for instance, Weise (1999), Kandil (1995), Morgan (1993), and Cover (1992).

Appendix 1: Definition of Small and Medium-Size Industries and the Break-down of Manufacturing Components of Industrial Production Index in Malaysia

In January 1998, the Minister of International Trade and Industry announced a new definition for SMIs. According to the new definition, refering only to companies in the manufacturing sector, SMI is defined as a company with full-time employees not exceeding 150 and with an annual sales turnover not exceeding RM25 million. Two categories of SMIs are identified:

- *Small Scale Company*: A company with full-time employees not exceeding 50 and an annual sale turnover not exceeding RM 10 million.
- *Medium Scale Company*: A company with fill-time employees between 51 and 150 employees, with an annual sales turnover of more than RM 10 million to RM 25 million.

SMIs play a crucial role in Malaysia's industrialization program by strengthening both forward and backward industrial linkages. The Second Industrial Master Plan contains policies and programs to further develop and integrate domestic SMIs as the critical and strategic link to develop and strenghten the cluster formation and to increase domestic value-added. According to the Plan, the SMIs will assume these roles by complementing the activities of large-scale industries via integration into the mainstream of industrial development, through the provision of critical parts and components, as well as by expanding their markets internationally.

Currently, SMIs constitute more than 80 percent of the total manufacturing establishments; they contribute 13.8 percent to total output and 17.4 percent to employment. The majority of SMIs are still concentrated in the traditional areas indicated below (the percentage distribution of the SMI establishment in various sectors are indicated in parantheses):

- Food and beverages (20 percent);
- Fabricated metal products (18 percent);
- Wood and wood products (17 percent);
- Basic metal (4%).

The table below illustrates the breakdown of manufacturing components of industrial production:

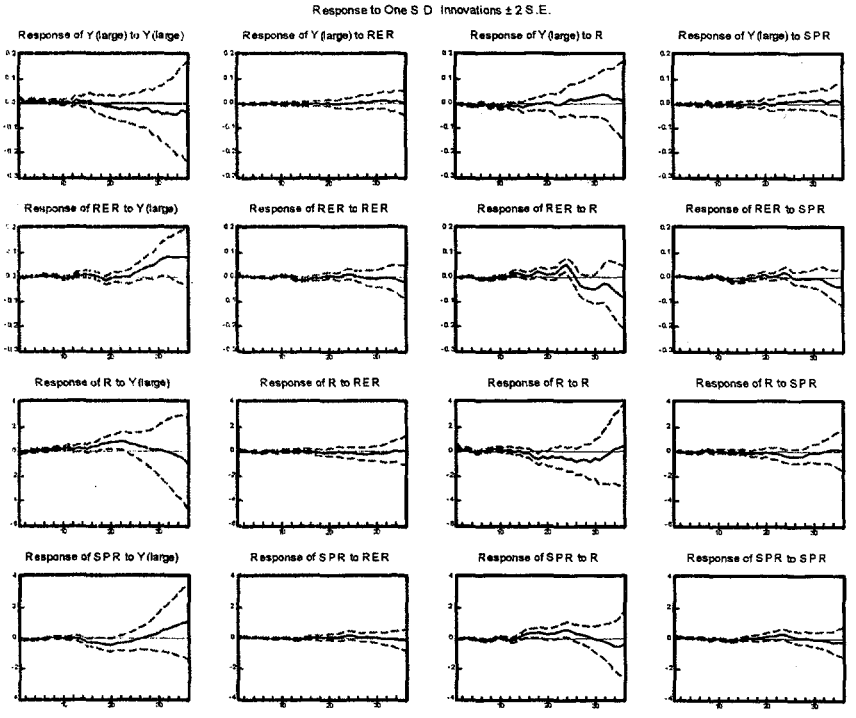
Table A1. Break-down of Manufacturing Components of Industrial Production Index

	Industry Group	Weight
1	Food manufacturing	6.34
2	Beverage industries	0.63
3	Tobacco industries	0.86
4	Textiles	2.18
5	Wearing apparel except footwear	1.75
6	Footwear except vulcanized or moulded rubber or plastic footwear	0.08
7	Wood, wood & cork products except furniture	5.42
8	Paper & paper products	1.19
9	Industrial chemicals	6.63
10	Other chemical products	1.67
11	Crude oil refineries	0.96
12	Misc. products of petroleum & coal	0.29
13	Rubber products	3.72
14	Plastic products, n.e.c.	2.59
15	Glass & glass products	0.46
16	Non-metallic mineral products	2.97
17	Iron & steel basic industries	2.23
18	Non-ferrous basic industries	0.58
19	Fabricated metal products except machinery & equipment	3.19
20	Machinery except electrical	2.94
21	Electrical machinery, apparatus, appliances & supplies	20.23
22	Transport equipment	2.57
23	Professional & scientific & measuring & controlling equipment, n.e.c.	0.95
		70.43

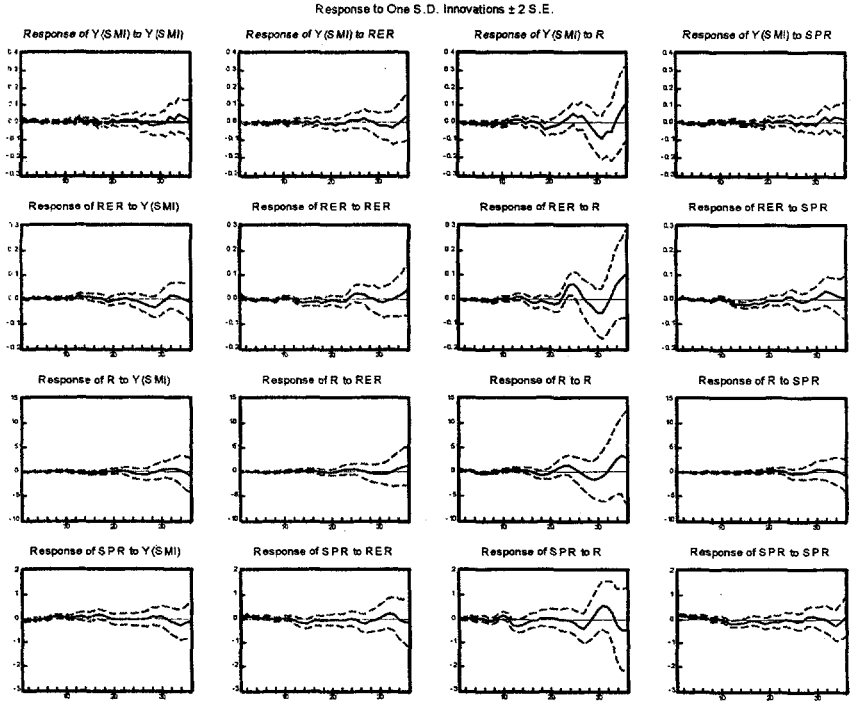
Source: Department of Statistics

Appendix 2: Impulse Response Functions: SMIs versus Large Manufacturing Firms

Impulse Response Functions: Large Manufacturing Firms



Impulse Response Functions: SMIs



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